

Claims

1. A medical connector having a longitudinal axis and interconnected axially aligned relatively rotatable male and female Luer parts forming a housing whereby relative rotation of said parts opens and closes a fluid flow path through said connector, said parts being  
5 configured for connection to external male and female Luer flowlines;

a flow conducting insert non-rotatably affixed in said female Luer part, said insert having an internal fluid passageway extending from a first axially aligned end to a second end, said second end being offset from said axis;

a compressible seal in said male Luer part, said seal abutting said second end of  
10 said insert and having a flow passageway extending between a first axially offset end at said second end of said insert to an axially aligned second end, such that said ends of said flow passageways in abutting ends of said insert and seal may be aligned to open said flow path; and

an elastomeric stopper on said insert, said stopper having a swabbable end providing a deformable normally closed opening which may be opened by pushing said swabbable  
15 end over said insert by an external male Luer received in said female Luer part, said stopper having an annular axially collapsible skirt engaged with said female Luer part and said insert.

2. The medical connector of claim 1, wherein said first end of said insert is rounded to facilitate opening of said normally closed opening.

3. The medical connector of claim 2, wherein in said insert includes a seat  
20 engageable with said second end of said skirt.

4. The medical connector of claim 3, further comprising relatively engageable stop surfaces on said skirt and said female Luer part to axially retain said skirt in said female Luer part with an exterior surface of said end of said stopper flush with a surrounding portion of said female Luer part.

25 5. The medical connector of claim 4, wherein said skirt has an axially expansible

and contractible portion between said annular seat and said stop surface.

6. The medical connector of claim 5, wherein said skirt slidably contacts said female Luer part and said insert.

7. The medical connector of claim 6, wherein said skirt includes a sealing portion  
5 which engages said female Luer part and said insert.

8. The medical connector of claim 1, wherein said insert and said female Luer part have mating portions of non-circular cross-section for non-rotatably positioning said insert in said female Luer part.

9. The medical connector of claim 1, wherein said seal and said male Luer part  
10 have at least one mating groove and rib to non-rotatably position said seal in said male Luer part.

10. The medical connector of claim 1, wherein said female and male Luer parts have abutting faces and exposed surfaces adjacent said faces, said exposed surfaces having indicia which may be aligned at full open and closed positions of the connector.

11. The medical connector of claim 10, wherein said abutting faces extend in radial  
15 planes.

12. The medical connector of claim 10, further comprising slidably engageable surfaces on said female and male Luer parts defining full open and closed positions of said connector.

13. The medical connector of claim 1, wherein said female Luer part and said seal  
20 have abutting radially extending surfaces.

14. The medical connector of claim 13, wherein said insert and said seal have abutting radially extending surfaces.

15. The medical connector of claim 1, wherein said female and male Luer parts are connected by a snap fit.

25 16. The medical connector of claim 15, wherein said snap fit connection of said

male and female Luer parts causes compression of a peripheral portion of said seal.

17. The medical connector of claim 1, wherein said female and male Luer parts and said insert are made of polycarbonate and said stopper and said seal are made of silicone.

18. An elastomeric stopper having an axially extending skirt which includes a  
5 longitudinally expansible and contractible portion and an integrally formed end, said end having a normally closed slit to provide a deformable opening to the interior of said skirt.

19. The stopper of claim 18, wherein said end has a first outside diameter, and said skirt includes a collar and a bellows having a second outside diameter larger than said first outside diameter.

10 20. The stopper of claim 19, wherein said skirt includes a cylindrical outer surface at a second end.

21. The stopper of claim 20, wherein said skirt includes a radially extending surface at said second end.

22. The stopper of claim 21, wherein said skirt is silicone elastomer.

15 23. A medical connector having a longitudinal axis and interconnected axially aligned relatively rotatable male and female Luer parts forming a housing whereby relative rotation of said parts opens and closes a fluid flow path through said connector, said parts being configured for connection to external male and female Luer flowlines;

20 a flow conducting insert non-rotatably affixed in said female Luer part, said insert having an internal fluid passageway extending from a first axially aligned end to a second end, said second end being offset from said axis, said insert having an axially compressible section;

a compressible seal in said male Luer part, said seal abutting said second end of said insert and having a flow passageway extending between a first axially offset end at said second end of said insert to an axially aligned second end, such that said ends of said flow  
25 passageways in abutting ends of said insert and seal may be aligned to open said flow path; and

an elastomeric stopper on said insert, said stopper having a swabbable end providing a deformable normally closed opening which may be opened by pushing said swabbable end over said insert by an external male Luer received in said female Luer part.

24. The medical connector of claim 23, wherein said axially compressible section  
5 of said insert is corrugated.

25. The medical connector of claim 24 wherein in said insert includes a seat engageable with said second end of said skirt.

26. The medical connector of claim 25, wherein said corrugated section is proximate said seat.

10 27. A medical connector having a longitudinal axis and comprising:  
interconnected axially aligned relatively rotatable parts forming a housing with a fluid flow passageway in said housing, said parts being configured for connection to external male and female Luer flowline connectors;

a compressible seal in said housing having a flow passageway extending from an  
15 axially aligned end to an axially offset end whereby relative rotation of said parts opens and closes a fluid flow path through said connector; and

a retrograde flow preventer positioned in said fluid flow path, said preventer having a resilient portion with a normally closed fluid conducting perforation in said resilient portion which opens at fluid delivery pressures exerted on an interior surface of said resilient portion and  
20 which remains closed at patient vascular pressures exerted on an exterior surface of said resilient portion.

28. The medical connector of claim 27, wherein said perforation opens when said interior surface is exposed to negative pressure of an aspirating syringe.

29. The medical connector of claim 28, wherein said first part is a male Luer  
25 connector and said second part is a female Luer connector.

30. The medical connector of claim 29, wherein said retrograde flow preventer is integrally formed on said compressible seal and has an exterior surface projecting toward a male end of said male Luer connector.

31. The medical connector of claim 30, wherein said exterior surface of said  
5 retrograde flow preventer is positioned in a recess in said male Luer connector.

32. The medical connector of claim 31, further comprising a clearance space between said exterior surface and said recess whereby said exterior surface of said preventer is exposed to fluid in said fluid flow path.

33. The medical connector of claim 31, wherein said perforation comprises at least  
10 one slit.

34. The medical connector of claim 33, wherein said compressible seal is silicone.

35. The medical connector of claim 29, wherein said retrograde flow preventer has an exterior surface projecting toward a male end of said male Luer connector.

36. The medical connector of claim 35, wherein said exterior surface of said  
15 retrograde flow preventer is positioned in a recess in said male Luer connector.

37. The medical connector of claim 36, further comprising a clearance space between said exterior surface and said recess whereby said exterior surface of said preventer is exposed to fluid in said fluid flow path.

38. The medical connector of claim 37, wherein said perforation comprises at least  
20 one slit.

39. The medical connector of claim 38, wherein said compressible seal is resilient elastomer.

40. A medical connector having a longitudinal axis and comprising:  
interconnected axially aligned relatively rotatable parts forming a housing with a  
25 fluid flow passageway in said housing, said parts being configured for connection to external male

and female Luer flowline connectors;

a compressible seal in said housing having a flow passageway extending from an axially aligned end to an axially offset end whereby relative rotation of said parts opens and closes a fluid flow path through said connector;

5 a retrograde flow preventer positioned in said fluid flow path, said preventer comprising a resilient member having a normally closed fluid conducting perforation which opens at fluid delivery pressures exerted on an interior surface of said retrograde flow preventer and which remains closed at patient vascular pressures exerted on an exterior surface of said retrograde flow preventer;

10 a flow conducting insert non-rotatably affixed in said female Luer part, said insert having an internal fluid passageway extending from a first axially aligned end to a second end, said second end being offset from said axis;

said compressible seal being positioned in said male Luer part, said seal abutting said second end of said insert and said flow passageway extending in said seal between a first  
15 axially offset end at said second end of said insert to an axially aligned second end, such that said ends of said flow passageways in abutting ends of said insert and seal may be aligned to open said flow path; and

an elastomeric stopper on said insert, said stopper having a swabbable end providing a deformable normally closed opening which may be opened by pushing said swabbable  
20 end over said insert by an external male Luer received in said female Luer part, said stopper having an annular axially collapsible skirt engaged with said female Luer part and said insert.

41. The medical connector of claim 40, wherein said first end of said insert is rounded to facilitate opening of said normally closed opening.

42. The medical connector of claim 41, wherein in said insert includes a seat  
25 engageable with said second end of said skirt.

43. The medical connector of claim 42, further comprising relatively engageable stop surfaces on said skirt and said female Luer part to axially retain said skirt in said female Luer part with an exterior surface of said end of said stopper flush with a surrounding portion of said female Luer part.

5           44. The medical connector of claim 43, wherein said skirt has an axially expansible and contractible portion between said annular seat and said stop surface.

45. The medical connector of claim 44, wherein said skirt slidably contacts said female Luer part and said insert.

10           46. The medical connector of claim 45, wherein said skirt includes a sealing portion which engages said female Luer part and said insert.

47. The medical connector of claim 40, wherein said insert and said female Luer part have mating portions of non-circular cross-section for non-rotatably positioning said insert in said female Luer part.

15           48. The medical connector of claim 40, wherein said seal and said male Luer part have at least one mating groove and rib to non-rotatably position said seal in said male Luer part.

49. The medical connector of claim 40, wherein said female and male Luer parts have abutting faces and exposed surfaces adjacent said faces, said exposed surfaces having indicia which may be aligned at full open and closed positions of the connector.

20           50. The medical connector of claim 49, wherein said abutting faces extend in radial planes.

51. The medical connector of claim 49, further comprising slidably engageable surfaces on said female and male Luer parts defining full open and closed positions of said connector.

25           52. The medical connector of claim 40, wherein said female Luer part and said seal have abutting radially extending surfaces.

53. The medical connector of claim 52, wherein said insert and said seal have abutting radially extending surfaces.

54. The medical connector of claim 40, wherein said female and male Luer parts are connected by a snap fit.

5 55. The medical connector of claim 54, wherein said snap fit connection of said male and female Luer parts causes compression of a peripheral portion of said seal.

56. The medical connector of claim 40, wherein said female and male Luer parts and said insert are made of polycarbonate and said stopper and said seal are made of silicone.

10 57. The medical connector of claim 40, wherein said perforation in said retrograde flow preventer opens when said interior surface is exposed to negative pressure of... psi or lower.

58. The medical connector of claim 57, wherein said first part is a male Luer connector and said second part is a female Luer connector.

15 59. The medical connector of claim 58, wherein said retrograde flow preventer is integrally formed on said compressible seal and has an exterior surface projecting toward a male end of said male Luer connector.

60. The medical connector of claim 59, wherein said exterior surface of said retrograde flow preventer is positioned in a recess in said male Luer connector.

20 61. The medical connector of claim 60, further comprising a clearance space between said exterior surface and said recess whereby said exterior surface of said preventer is exposed to fluid in said fluid flow path.

62. The medical connector of claim 60, wherein said perforation comprises at least one slit.

63. The medical connector of claim 62, wherein said compressible seal is silicone.

25 64. The medical connector of claim 58, wherein said retrograde flow preventer has an exterior surface projecting toward a male end of said male Luer connector.



65. The medical connector of claim 64, wherein said exterior surface of said retrograde flow preventer is positioned in a recess in said male Luer connector.

66. The medical connector of claim 65, further comprising a clearance space between said exterior surface and said recess whereby said exterior surface of said preventer is  
5 exposed to fluid in said fluid flow path.

67. The medical connector of claim 66, wherein said perforation comprises at least one slit.

68. The medical connector of claim 67, wherein said compressible seal is silicone.